

Metazoon the nuclei of the germ-cells, so here the so-called nucleoli come into intimate contact, and the result here as there is an intermixture of different germ-plasmas. With Weismann, I am convinced that this result is the purpose of both sexual fecundation and conjugation, and the condition of the variability of the individuals, without which species-production would be impossible.

With the certainty that in the phenomena of conjugation the essential thing is the exchange of nuclear substance in the two conjugated individuals, we stand on much more solid ground for the explanation of these processes, and may for the future drop all more indefinite notions. Among these we have as the chief the most generally entertained opinion, which indeed is apparently supported by facts, that the purpose of conjugation is the rejuvenescence of Infusoria exhausted by continual division*.—*Berichten der naturf. Gesellschaft zu Freiburg I. B.* Band ii. (1886) Heft 1.

On the Influence of certain Rhizocephalous Parasites upon the External Sexual Characters of their Host. By M. A. GIARD.

Most of the Rhizocephala parasitic upon the Decapod Crustacea occasion the atrophy of the genital glands of their host without the external sexual characters of the latter undergoing the least modification. Thus *Sacculina triangularis*, Anderson, which occurs pretty frequently at the Poulignan, and more rarely at Concarneau, upon *Platycarcinus pagurus*, affects both males and females, widely projecting on each side of the narrow tail of the former, while it is entirely protected by the broader appendage of the other sex.

But this is not always the case, and in some instances the parasite by its presence causes modifications so extensive that the infested males become like the females in types in which sexual dimorphism is most strongly marked. A very distinct example of this is furnished by *Sacculina Fraissei*, sp. nov., a parasite of *Stenorhynchus phalangium*, Penn. This *Sacculina*, indicated but not described by Fraisse in the Bay of Naples, occurs commonly at Concarneau, in the Baie de la Forcst. We may estimate at one in fifty the number of *Stenorhynchi* infested by this Rhizocephalan. As in the case of the *Sacculina* of *Carcinus maenas*, the parasite arrives at its complete formation during the period of reproduction of the crab, that is to say, in the present case, during the months of June and July.

Sacculina Fraissei is easily distinguished from other species of the same genus by its external form and its organization. It is entirely concealed in the kind of box formed by the tail of the crab and the sternal plastron. Its outline is heart-shaped. The cloacal aperture is nearly sessile, irregularly triangular in the young. The chitinous ring which surrounds the peduncle is very simple and not strongly marked. The peduncle is short; the roots are thicker and more irregularly ramified than those of *S. Carcini*; the collaterie glands are well developed and situated upon the sides and towards the upper third of the height. The orientation is the same as that of *Sacculina carcini*. The nearly spherical testes are situated at the

* The author promises a more detailed paper with figures.

median part of the posterior half of the ovaries nearly at the centre of figure of the parasite; they give origin each to a long deferent duct, which reaches the posterior margin and turns round it to open in the supra-peduncular region. *Sacculina Fraissei* therefore belongs to the group of *mesorchideous Sacculine*, the type of which is *Sacculina corculum*, Kossm., parasitic upon *Atergatis floridus*.

At first it appeared to me that only the females of *Stenorhynchus* were infested by the parasite, which appeared the more surprising because in *Stenorhynchus phalangium* the number of males is much greater than that of the females. A more careful examination showed me that the male sex has no indemnity, although it seems to be less frequently attacked (about one in six).

In the females the influence of the parasite makes itself felt externally by a profound modification of the four pairs of ovigerous feet. These appendages are much reduced, although we cannot attribute their atrophy to wearing caused by the friction of the *Sacculina*. I have indeed ascertained that in adult females in which the recently evaginated *Sacculina* was still small, the ovigerous feet already presented the poor appearance of aborted organs.

I soon observed infested *Stenorhynchi*, apparently quite similar to the preceding, in which these feet did not exist at all, but in which I easily found copulatory styles, greatly reduced it is true, and a different position of the genital aperture. These individuals were males, the tail of which, however, had all the external characters of the female appendage, and seemed arranged so as to shelter the parasite as perfectly as it shelters the ova in the other sex.

Moreover, the secondary sexual characters of these infested males were also modified in the same direction as the primary characters. The chelæ, instead of being strongly developed, were reduced, and did not much exceed the head as in the normal males; in one word they presented the same arrangement as in the females. All these peculiarities are the more striking because in the normal condition *Stenorhynchus* is one of the Brachyurous Decapods in which sexual dimorphism is best shown.

To find facts comparable with those just set forth we have to invoke the effects produced by castration in the higher Vertebrata, and the appearance in eunuchs of certain secondary sexual characters usually belonging to the female sex.

From another point of view, the false finality, unfavourable to the crab, which causes the appearance in one sex of a character of the other sex with the apparent object of protecting a parasite, is not the only example presented to us by nature of this sort of struggle between natural selection and sexual selection. Do not we see the stamens of *Melandryum dioicum*, normally aborted in the female sex, become developed nevertheless when the plant is infested by *Ustilago antherarum*, so that the plant becomes, *apparently*, hermaphrodite in order to allow of the fructification of the parasite?

It is probable that the observations which I have made upon the *Sacculina* of *Stenorhynchus* may be extended to other species, and especially to the *Sacculina neglecta* of *Inachus scorpio*, which, according to Fraisse, only infests the females. Therefore I make a point of declaring that I abandon the argument which I had drawn from

this against the theory of the migration of the embryo of the Rhizocephala. I also add that all the facts contained in this note are perfectly well explained under the hypothesis of direct fixation which still appears to me much the most probable.—*Comptes Rendus*, July 5, 1886, p. 84.

The Bed-Bug and its Odoriferous Apparatus.

By M. J. KÜNCKEL.

I have ascertained that the young *Cimices*, on issuing from the egg, bear three odorific glands, situated in the dorsal region of the abdomen. These glands occupy the median portion of the first three segments: all three, of the same dimensions, when seen under the microscope affect the form of a more or less inflated satchel; their outline exactly reproduces the contour of a melon-glass, with the bottom turned towards the head. Each gland opens externally by two orifices, placed on either side of the median line, and arranged transversely at the margin of the first, second, and third tergites, just over the line of separation of the segments; they have the aspect of open button-holes.

If we examine the young bugs when their digestive tube is gorged with blood, it is impossible, on account of their opacity, to perceive the odoriferous glands: to study these we must render the insects transparent by means of special artifices. We shall not at present describe their histological structure, but merely remark that they are cutaneous glands formed by a fold of the skin; moreover, after treatment with caustic potash we can ascertain that the cuticle of the integument is continuous with the invaginated cuticle which lines the interior of the gland.

These three *abdominal and dorsal* glands persist until the last change of skin; they then become atrophied and are replaced by a *thoracic and sternal* glandular apparatus. The Cimicides, which drink blood, like the Scutellerides, Pentatomides, Coreides, Lygæides, &c., which suck sap, are therefore provided with two systems of organs of secretion, situated in two opposite regions of the body, according as they are in the state of larva or pupa, or in the adult state.

The presence at different ages in the same insect of glands having different anatomical relations, but possessing the same physiological attributes, is a fact which leads us to interesting deductions. In fact when I first indicated it, in 1866*, I endeavoured to explain it, and I said that the glands of the pupæ became atrophied, because in the Pentatomides and others the scutellum, elytra, and wings coming to cover the superior arches of the abdomen, would place an obstacle in the way of the performance of their physiological function; but the bed-bug having only a short scutellum, small elytra, and no wings, the tergites of the abdomen are never covered, and it would seem that my explanation was defective: it will suffice for me to remark that this Hemipteron is an aberrant type, transformed by adaptation, that is to say, having lost its aerial locomotor organs to conform to a sedentary existence subordinated to the biological conditions imposed by its cohabitation with man; on the other hand,

* 'Comptes Rendus,' 2^e semestre, 1866, p. 483.